Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

On the measurement of Lagrangian correlation functions in drift wave fluctuations[1] FRED SKIFF, VIKRAM PATEL, XING LI, University of Iowa, SHUNJIRO SHINOHARA, TAISEI MOTOMURA, Kyushu University — We explore the possibility of measuring Lagrangian correlation functions in drift wave turbulence in a magnetized plasma cylinder. The connection between Lagrangian and Eulerian correlation functions is known to be complex. For example it is possible for the same process to exhibit chaotic Lagrangian trajectories and at the same time to have a completely integrable Eulerian flow. Using laser-induced fluorescence it is possible to realize the measurement of both Eulerian and Lagrangian correlation functions depending on the degree of optical pumping. We explore the effects of optical pumping on the Eulerian limit (weak optical pumping) as well as what can be learned in the limit of strong optical pumping where the signal is best interpreted in the Lagrangian sense ("optical tagging"). Preliminary data are obtained in a singly ionized Argon plasma with density of 10^9 - 10^{10} cm^{-3} an electron temperature of typically 4 eV and an ion temperature of typically 0.1 eV. LIF data are collected using both diode laser light at 668 nm and dye laser light at 611nm to excite metastable fluorescence lines.

[1]Work supported by the US DOE and NSF through the collaboration on basic plasma science.

Fred Skiff
University of Iowa

Date submitted: 15 Jul 2010 Electronic form version 1.4